PROGRAM CONTEXT ATTRIBUTES CHAPTER 7

In this chapter, we address our proposed methods for characterizing additional attributes of the RCRA Subtitle C program not covered in the previous sections, which we call "program context attributes." As explained in Chapter 1, OSWER is developing a process for evaluating a broad set of program impacts and features, beyond those evaluated in traditional benefit-cost analyses. The results of implementing the methods described in this report are expected to be reviewed and used by both internal EPA managers as well as external stakeholders with an interest in the performance of the RCRA Subtitle C program. To this end, OSWER believed it was important to go beyond the attributes typically considered in a traditional cost/benefit analysis, to also characterize and describe other program features and factors that influence the design, implementation, performance, and impacts of OSWER programs. OSWER believed these "program context attributes" could be relevant to those internal and external reviewers trying to gain a better understanding of the impacts and drivers behind OSWER programs.

Some of these attributes may, in fact, be associated with real benefits or costs, but it is not possible to identify the net effects of these attributes using available data. Others simply represent factors that can influence the performance of the RCRA program. Program context attributes associated with the RCRA Subtitle C program include:

- **EPA regulatory reinvention initiative impacts.** Recent efforts to refine the implementation of the RCRA program may have effects on future costs and benefits of the regulations;

- **Regulatory constraints under RCRA** include several statutory and legal requirements that can affect program priorities, costs, and benefits;

- **Stakeholder issues** identify the extent to which program priorities are defined by, and responsive to, stakeholder interests and needs.

- **Technology forcing impacts.** RCRA regulations may have provided incentives for the rapid development and adoption of technologies that reduce the generation or disposal of hazardous waste;

- **Long-term effects: behavioral change** related to RCRA Subtitle C regulations may have implications for program implementation, and may be related to changes in the long-term social value of environmental quality.

Below we suggest approaches for characterizing these attributes.

7.1 BENEFITS, COSTS AND IMPACTS OF EPA REGULATORY REINVENTION INITIATIVES

In recent years EPA has undertaken a number of initiatives designed to revise and clarify RCRA Subtitle C program priorities. Key among these initiatives are voluntary efforts such as the waste minimization program, which increases program emphasis on source reduction and recycling. In particular, waste minimization targets persistent, bioaccumulative, and toxic (PBT) wastes, and encourages generators to reduce, eliminate, or recycle these wastes. In this way the program aims to improve the cost-effective reduction of risk through pollution prevention.

More recent EPA regulatory reinvention efforts have focused on reducing the regulatory burden of RCRA. The Agency introduced three new rules in 1998 that have implications for future costs of complying with RCRA Subtitle C regulations:[1]

- April 1998 *Land Disposal Restrictions Phase IV, Final Rule: Promulgating Treatment Standards for Metal Wastes and Mineral Processing Wastes* encourages recycling for mineral processing wastes and introduces new soil standards that allow land disposal rather than incineration of some contaminated soils.

- October 1998 *Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities: Post-Closure Permit Requirement and Closure Process: Final Rule* streamlines closure of hazardous waste disposal facilities by providing an enforceable document alternative to the post-closure permitting process, and allows site specific post-closure permitting to reconcile conflicting requirements for hazardous and solid wastes.

- November 1998 *Hazardous Waste Identification Rule for Contaminated Media (HWIR-Media), Hazardous Remediation Waste Management Requirements* were released. The new requirements allow storage of

[1] Environmental Protection Agency Office of the Administrator 1998 annual report *Reinventing Environmental Protection*, March 1999 (EPA100-R-99-002) pp.64-66.

contaminated soils during clean-up and simplify approval of state hazardous waste management programs as they incorporate new federal requirements.[2]

All of these activities may have a measurable effect on the production and management of hazardous waste and on the costs associated with these activities. However, the benefits of these initiatives are difficult to incorporate into a retrospective analysis for two reasons:

1. Most reinvention activities are too recent to be reflected in a retrospective analysis. The most recent data available about waste generation quantities and costs pre-date EPA's recent reinvention activities.

2. The effects of these programs are difficult to isolate within the broader data available from the Biennial Reporting System. While general reporting data may show decreases in waste generation or in the cost of waste disposal, it is difficult to attribute these changes directly to a specific EPA initiative.

While the benefits of these initiatives are not relevant to a retrospective analysis and we do not provide a method for addressing them here, the potential benefits of reinvention initiatives should be incorporated into the future cost estimates in any prospective analysis of the RCRA program. The methodologies for measuring these costs are relatively simple. For example, to calculate projected savings due to reduced permit requirements, EPA estimates reduced "burden hours," or hours saved by streamlined requirements. The benefit is calculated as the number of hours saved multiplied by the average cost per hour of personnel responsible for the "old" permitting requirements.

Similarly, the success of the Waste Minimization effort may be difficult to isolate and measure due to its relatively recent development in 1993. However, the results of the program should be reflected in the general trends revealed in BRS and cost data; reduction in waste quantities and in the number of facilities generating and/or managing hazardous waste (and associated reductions in costs) may be attributable to a combination of waste minimization programs and more general prevention efforts. Also, if recent (and future) BRS data show a significant reduction in the generation of PBT wastes relative to total wastes, then some or all of the reduction in risk associated with this shift may be attributable to waste minimization activities.[3] Estimating the risk reduction related to reduced PBT waste would require a facility-level examination of process changes at

---

[2] Final Rule November 30, 1998 *Federal Register* pp. 65873-947 and December 30, 1998 *Federal Register* pp. 66101- 2.

[3] To estimate risk reduction associated specifically with decreases in both total hazardous wastes and PBT wastes it is necessary to determine the level of risk associated with Subtitle C waste management. Our proposed methods make the initial assumption that this risk is insignificant, but we recommend that this assumption be examined closely during implementation.

facilities reporting decreases in PBT waste, in order to determine the net effect of waste minimization efforts. For example, if a facility prevents generation of a small amount of PBT waste by producing a large amount of non-PBT hazardous waste, then the net benefit might be very small.

7.2 REGULATORY CONSTRAINTS UNDER RCRA

Several statutory and congressional mandates and court actions have influenced the scope of the RCRA regulations and policy options for its implementation. These constraints on RCRA activities may have an important influence on what can be done under the RCRA program. For example, certain constraints may limit the scope of RCRA or may require EPA to implement specific initiatives. Bureaucratic or legal incidents can play a positive role in refining RCRA specifications, but can also be costly and time consuming. In many cases legal and congressional restrictions force EPA to prioritize certain regulatory activities over others. In the context of conducting an evaluation of the costs, benefits, and other impacts of the RCRA Subtitle C program, it could be important to understand the source of the drivers behind those impacts. In a complete assessment of the RCRA program, we recommend citing examples of important statutory requirement and court decisions that influence the design and implementation of the RCRA Subtitle C program. Examples include the following.

7.2.1 *Congressional Actions*

- **Section 3001 (b)(3)(A), Bevill Amendment:** The Bevill amendment is an example of a congressional mandate that defines parameters of the RCRA Subtitle C Program. The Bevill Amendment exempts several sectors of hazardous waste generators, including those that generate mining wastes, mineral processing wastes and cement kiln dust. As a result, RCRA does not apply to key waste streams in major sectors. It is important to note that more recent RCRA actions have reduced the reach of the original Bevill Amendment. In other words, RCRA now regulates some facilities that were once exempt. However, continued existence of the Amendment may limit the potential benefits of the program.

- **Hazardous and Solid Waste Amendments (HSWA):** HSWA is an example of a statutory congressional requirement issued to EPA. HSWA restricted land disposal of hazardous wastes beyond specified dates unless waste was treated to meet certain RCRA-equivalent standards. EPA was required to enact land disposal restrictions and treatment standards by May 8, 1990 for all wastes that were either listed or identified as hazardous by the 1984 amendments. A later deadline was issued for wastes listed after 1984. In this case, EPA's implementation of RCRA requirements was influenced

by a congressional statute which guided the Agency's priorities and changed the scope of RCRA regulations.

7.2.2 *Court Decisions*

Several major court decisions had considerable influence on the interpretation and implementation of RCRA. For example:

- **Chemical Waste Management v. EPA:**[4] A series of Chemical Waste Management, Inc. v. EPA decisions in 1989 and 1992 had the following general effects: 1) Broadened the scope of RCRA by upholding the "derived from" rule that any soil or water that contains hazardous waste is itself hazardous waste; 2) Upheld EPA's right to authorize placement of decharacterized hazardous wastes into Subtitle D impoundments if dilution meets RCRA treatment definitions (limiting the scope of RCRA); and 3) Broadened the scope of RCRA by upholding the "Third Thirds" rule which requires treatment of characteristic hazardous wastes to levels where they are decharacterized.

7.2.3 *Congressional/Court Actions*

The Land Disposal Program Flexibility Act (1996) is a case of EPA having to reconcile multiple and conflicting demands on how RCRA is implemented. A lawsuit filed with the District Court in 1992 (*EDF vs. Reilly*, Civ. No. 89-0598, D.D.C.) finalized more rigorous treatment standards under the land disposal restrictions program for hazardous wastes listed after 1984, and for wastes with hazardous waste components. In response to this court decision, however, Congress demanded additional research before adoption of the standards. The Land Disposal Program Flexibility Act amended Section 3004(g) of RCRA by requiring a risk characterization study of hazardous waste managed in units regulated under the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) program, pretreatment program, or in a zero discharge system. As a result, standards have not become stricter since the court ruling pending the risk characterization study.

7.2.4 *Characterizing Constraints Affecting RCRA Subtitle C Programs*

We suggest an examination of RCRA legislative mandates and court decisions in an effort to qualitatively describe their effects on RCRA policies and regulations. Some, such as the Bevill

---

[4] Chemical Waste Management, Inc. v. EPA, 869 F.2d 1526, 1536-37 (D.C. Cir. 1989) and Chemical Waste Management v. EPA, 976 F. 2d 2, 25 (D.C.Cir. 1992).

Amendment, may have far-reaching impacts on the scope and prioritization of program activities. Other constraints may have effects that are more difficult to characterize. For all key constraints the method would provide a qualitative discussion of the potential impacts on program priorities and activities.

7.3 STAKEHOLDER ISSUES

The final attribute in a complete analysis of RCRA is stakeholder issues; this attribute addresses the needs and demands of stakeholders. The purpose of this attribute is to inform decision-makers who may use a RCRA program evaluation about the role and intensity of stakeholder concerns.[5] Two aspects of stakeholder concerns are particularly relevant to RCRA: 1) the role and value of information collected under the regulations and available to the public (and to regulators), and 2) the level of stakeholder intensity of feeling about RCRA Subtitle C and about hazardous waste in general. Below we suggest a qualitative discussion of each of these issues based on available literature and information:

7.3.1 *Method for Characterizing Value of Information*

RCRA Subtitle C regulations include the development and reporting of various tracking information related to the generation and disposal of hazardous waste. This includes: individual manifest and tracking information verifying that individual waste shipments have been properly disposed; summary information on constituent facility waste generation and management provided by RCRA facilities in the *Biennial Reporting System* (BRS); and facility permit and enforcement information maintained in the RCRIS database. Various stakeholders use these systems, including:

- **Investigators and Enforcement Personnel**, including federal, state, and private personnel (e.g., insurance investigators) who use the manifest system and permit information to verify proper disposal and to support investigations of improper disposal;

- **Industries** who use historical tracking information showing reduced hazardous waste generation as a valuable marketing strategy; and

- **Members of the Public** who can obtain information about facilities and waste generation and management practices in specific areas, or over specific time periods.

---

[5] Stakeholder issues, such as intensity of feeling, are implicitly reflected (though not measured) by the Approach A methodology. It may be worthwhile to consider these impacts in isolation under all approaches, but particularly under Approaches B and C.

It is possible that these data could be associated with specific benefits linked to reductions in the cost of investigations and in the availability of high-quality data to support independent research efforts. However, it is impossible to isolate any quantitative benefits (or costs) associated with these efforts from other benefit and cost attributes that address reduced waste disposal and related outcomes. We therefore recommend a qualitative discussion summarizing the extent of the available information associated with RCRA and providing a summary of recent research on the value that the public places on available environmental information.[6] This qualitative analysis could be supported by quantitative estimates from the Agency about how many non-EPA stakeholders have requested data under the Freedom of Information Act (FOIA) or have accessed the data through EPA's Envirofacts website. This analysis would provide a qualitative discussion of the

7.3.2 *Method for Characterizing Intensity of Feeling*

Intensity of feeling describes the level of importance that stakeholders place on implementing (or repealing) environmental regulations. The extent to which the regulatory program is changed by stakeholder involvement frequently reflects intensity of feeling, particularly when the changes are counter to typical measures of economic value or efficiency. Examples of other programs that have been affected by intensity of feeling are the Superfund program, which was in part a result of public outrage over incidents such as Love Canal, and the safety standards and building codes for nuclear power plants, which are often much more protective than standards at other facilities with practices that also pose significant risks to the public (though risks of a different type).

To address intensity of feeling, we recommend a review of the history of RCRA, particularly the public and congressional activities leading up to the passage of the 1984 Hazardous and Solid Waste Amendments (HSWA). Though RCRA prevention has, in general, received much less public attention than the Superfund clean-up program, the extensive revisions to the law under HSWA may be illustrative of the intensity of feeling exhibited by the public about the mission and purpose of the regulation.

7.4 TECHNOLOGY FORCING CHARACTERISTICS

The treatment and disposal standards of the RCRA Subtitle C prevention program may have contributed to rapid technological advancement by creating economic incentives to avoid generation of hazardous waste or improve its treatment and disposal. In fact, RCRA Subtitle C regulations have

---

[6] The Toxics Release Inventory (TRI) database was developed under the Community Right-to-Know provisions of the Toxic Subtances Control Act (ToSCA). There is a well-established body of literature addressing the potential value of this source, and this information may assist in identifying the potential value associated with the similar BRS system.

explicitly mandated the elimination of certain types of waste treatment and disposal. The result of these advances could be highly efficient manufacturing systems that "over-comply" and produce less hazardous waste. In addition, technology advances could reduce costs, and provide competitive advantages for innovative companies.

Technology forcing could potentially result in true economic benefits. The benefits that would be attributable to RCRA are the improved consumer or producer surplus from process advances that would not have been implemented in the absence of regulation (though it is important to note that some "benefits" could be solely due to new costs imposed by the altered regulatory setting and would therefore not be net gains). However, it is very difficult to attribute technological advances to any specific regulatory or market force. For example, it is not possible to determine the "normal" pace of technological advancement in the absence of RCRA, in part because Superfund liability under CERCLA may have provided similar incentives to minimize waste disposal. Therefore we focus only on identifying indicators that technology forcing may have taken place, and do not attempt to quantify specific benefits or identify causality.

We propose two methodologies for addressing this attribute. The first is an "indicator approach." By examining a number of indicators it may be possible to provide support for the presence (or absence) of rapid technological advancement. The second is a primary research effort that collects data on technology development directly from suppliers; this approach is most appropriate in conjunction with a case-study based assessment of benefits (e.g., Approach C). Due to data limitations and the likely pace of technological development, both of these methodologies focus on technology development primarily since 1980 and in the presence of RCRA.

7.4.1 *Identify Likelihood of Technology Forcing through Indicators*

This approach incorporates three indicators that address the relationship between compliance costs, production, and profitability in industries regulated by RCRA. The approach is based on the assumption that in the absence of technological advance, costs under RCRA would increase and productivity and profitability would decrease, due the diversion of capital to address waste management. We therefore suggest a set of measurements that identify trends in the relationships between these data. Taken together, these indicators may help verify the existence and characterize the extent of technological advancement in the field of hazardous waste generation and management.

- **Compare pre-regulation industry Subtitle C compliance cost estimates with actual reported costs.** If pre-regulation estimates are significantly higher than reported costs, technological advances may be responsible for all or part of the difference (sources for this approach include PACE data and

pre-RCRA estimates from Arthur D. Little, Inc. *Economic Impact Analysis of RCRA Interim Status Standards*, 1981).[7]

- **Compare inflation-adjusted product price and production trends with waste trends for the top hazardous waste producing industries.** If prices are flat or decreasing as waste decreases, this may indicate that waste reduction technologies are not negatively affecting cost structure (sources for this measure include price trends from the *Statistical Abstract of the U.S.* or industry trade journals, and waste generation data from BRS).

- **Identify trends in waste generation per dollar value added (an indication of profitability) over time and compare industry-specific profitability with national, cross-industry profitability.** This measure identifies correlations between profitability and waste production for various industries (sources for this measure include quantity data from BRS or the *Statistical Abstract of the U.S.*, and dollar value added from *Census of Manufacturers*).

These indicators will not provide a single estimate of the economic value of technology forcing in the RCRA program. They will, however, assist in determining the extent to which technological advancement has occurred and has contributed to (or detracted from) profitability. While these indicators do not identify the relative pace of technology adoption in the with- and without-RCRA scenarios, and while some advances are likely due to market forces other than RCRA, these indicators may help address the contention that inflexible RCRA regulations prevent technological advancement.

7.4.2 *Identify Drivers of Technology Development Through Interviews*

An alternative method of evaluating technology forcing benefits is to conduct interviews with technology suppliers; the extent to which regulation drives the R&D and marketing efforts of these companies may indicate the extent to which technology adoption has been speeded (or the extent to which technologies have become economical) as a result of regulation.[8] In this context, incremental

---

[7] Note that technological advances are not the only explanation for higher "expected" than "actual" costs. Firms and industries have an economic incentive to provide high cost predictions during the regulatory development period.

[8] There is also considerable literature addressing the pace of technology development and its relationship to regulation, though no national studies have assigned a value to the effects of regulation on the pace of development. One publication with a number of analyses is *Competitive Implications of Environmental Regulations: A Study of Six Industries.* Management Institute for the Environment and Business, (Washington D.C., 1994).

profits from sales of technology that are driven by regulation may be a reasonable estimate of technology forcing benefits. The extent to which this approach can identify national estimates of the incremental profits due to RCRA will depend on the survey effort, including sample size and extent of information collected (note that if the sample size is larger than nine, an ICR would likely be required). If the effort is voluntary, competition concerns may limit the level of cooperation on the part of the technology industries. Exhibit B-9 in Appendix B provides a summary table of methodological options for addressing technology forcing in the RCRA context.

7.5 LONG-TERM EFFECTS: BEHAVIORAL CHANGE UNDER RCRA

Long-term behavioral change is frequently a stated or implied goal of environmental regulations, particularly those that (like RCRA Subtitle C) aim to eliminate externalities from the market by mandating that those who generate and manage hazardous waste assume the costs of proper treatment and disposal. The RCRA program requires immediate changes in treatment and disposal practice, but its broad aim is to affect the decisions and priorities of those who generate and manage hazardous waste. While the effects of many of these immediate changes are reflected in other attributes, the extent of change itself can often be a measure of the impact of a program.

"Long-term" behavioral change also implies a level of permanence such that repeal of regulatory incentives would not result in an immediate change back to pre-regulation behavior patterns. In the context of RCRA this type of change might result from alterations to production and waste treatment systems at generators and TSDs, respectively. An example of a permanent shift in behavior would be conversion to a newer production system that does not generate hazardous waste. In contrast, the shipment of waste to a recycling facility rather than a disposal facility may be a temporary behavior if regulatory reform provides a lower-cost disposal option. Note that this attribute likely addresses a subset of the technological developments identified in the discussion of technology forcing and could"double-count" some short-term benefits associated with these developments. Because we propose qualitative methods for addressing both of these attributes, we suggest that the issue of double-counting also be discussed qualitatively.

Our proposed method for characterizing this attribute is a study of the pollution prevention literature to identify the extent to which capital investment in new processes has reduced or eliminated the production of hazardous waste. Indicators of behavioral changes might include the number of capital pollution prevention projects completed, the total production capacity altered by pollution prevention capital investments, and the total quantity of hazardous waste eliminated as a result of these projects.[9] This approach may use any of the following sources:

---

[9] Note that the total quantity of waste reduced by pollution prevention projects does not double-count resource conservation benefits, because it is used only as an indicator of the extent of "permanent" changes in production. While some hazardous waste reduction may be the result of immediate changes in feedstock that do not represent process changes, the reductions in quantities

- Industry, state, and program-level assessments and progress reports generated by Waste Minimization programs, the Common Sense Initiative, Project XL, and other pollution prevention initiatives;
- Theoretical literature on the economic effects of environmental technology adoption patterns in key industries; and
- Specific project case studies that illustrate the potential changes in production and manufacturing systems under RCRA.[10]

In identifying relevant case studies and industry activities, it is important to focus on capital investment projects that specifically reduce or prevent the production of hazardous wastes. Where data are available, it may be possible to identify the net monetary benefits such as increased productivity and/or reduced waste production of specific environmental investments.[11]

The advantage of this approach is its flexibility. The number and type of studies collected can vary according to the scope and focus of the RCRA analysis. In addition, this approach is not resource intensive in that it does not require a primary data collection effort.

This approach has two limitations. First, it does not address causality, though in some cases reductions in hazardous waste may be specifically identified. However, many programs encourage pollution prevention, and it will be difficult to attribute activities and benefits to the RCRA program. Second, while it may be possible to identify benefits in specific cases, it may be difficult to generate a national estimate of the extent of capital investment due to company concerns about proprietary technologies and to a varying definition of "environmental" investments.

---

due to capital projects represent future waste production trends that are likely to remain stable.

[10] There are multiple examples of these studies in the literature, including some compilations such as: Springer, Johnny Jr. *Pollution Prevention Case Studies Compendium*. Risk Reduction Engineering Laboratory, U.S. EPA, 1992; Goldberg, Terri. *Pollution Prevention Successes: A Compendium of Case Studies From the Northeast States*. Northeast Waste Management Officials' Association, 1993; Badgett, Lona, et al. *Analysis of Pollution Prevention and Waste Minimization Opportunities Using Total Cost Assessment: A Case Study of the Electronics Industry*. Pacific Northwest Pollution Prevention Research Center, 1995.

[11] The pollution prevention literature uses Toxics Release Inventory information to measure success in terms of reduced outputs. However, TRI data are not specific to waste production or to constituents regulated under RCRA; for these reasons our methodology does not rely on this data source alone. Moreover, TRI does not identify capital investments; we believe that capital projects are a better indicator of long-term behavioral changes under RCRA.

Other changes in behavior under RCRA may be considerable and should be at least qualitatively described in a RCRA program evaluation, but are even less measurable. For example, as a result of RCRA and other environmental laws, including CERCLA, it has become common practice to examine property for unremediated pollution prior to a purchase. The expectation of proper waste management and remediation by property owners likely represents a permanent change in the perception of liability and responsibility. However, identifying the value of this change in the benefits due to RCRA (as opposed to CERCLA, for example) may be impossible.